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THE INDICATOR

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PUBLISHED IN THE INTERESTS OF THE
OTIS ELEVATOR INDUSTRY

The design of this publication is to give to the co-workers of the Otis Elevator Company a more comprehensive knowledge of the industry, to encourage individual effort and to unite in closer co-operation all those actively engaged in promoting the growth of the Company.

THE building of the Buffalo Works began in 1905, as a result of the demand for additional manufacturing facilities required by our rapidly increasing business.

No little thought was given to the best location for the works, which were planned to have an output which would be shipped to all parts of the United States, and it was finally decided that Buffalo was the logical point, because of its unequaled location as a shipping point and the comparative short distance from there to the source of raw material. If you were to describe a circle having a radius of 500 miles, its center being Buffalo, you would find that within its circumference would be included the principal cities of the east, south and middle west, with transportation lines radiating from Buffalo to most of them direct.

The Buffalo Works are located in the northeastern part of the city, on the Belt Line of the New York Central Lines, surrounding practically the entire city, and furnishing railroad facilities to its principal manufacturing industries. The works are easily reached from the center of the city by trolley line, which passes by our property. The Company owns sufficient land, in addition to that occupied by the present buildings, to take care of any future extensions which it may be desirable to make.

At present there is one main manufacturing building 307 feet by 403 feet, one story high, divided into six longitudinal bays of approximately equal width. Each of the bays is served with electric traveling cranes, as well as the transverse bays at each end of the building. These last cranes overlap those referred to above, so that material is easily transported from one part of the shop to another with the minimum of handling.

The products of the Buffalo Works at present are as follows: Tee Rails, Plunger Elevator Parts complete, Type "X" Electric Machines in all sizes, No. 1-N Straight and No. 1-N Geared Machines, Philadelphia Type of Single and Double Belt Machines, Car Frames and all Hatchway Parts, Hand Power Elevators of all types, as manufactured at the Peru Works in the past, Oil Buffers, both Spring and Gravity Return.

One entire bay, known as No. 1, is given to the manufacture of plungers and cylinders, and parts of oil buffers.

The adjoining bay, No. 2, is given up to the assembling of the electric and belt machines and the assembling of cylinders and plungers. The space reserved for this last purpose is approximately 400 feet long, so that a plunger of this length and cylinder for the same may be completely assembled and tested.

The bay adjoining No. 3 is devoted entirely to the machining of the various parts of the electric and belt machines and the machining of the new type "S" steel frame motor, the castings for which are made in our Chicago foundry, sent to Buffalo for machining, and distributed by them to the various works furnishing this type of motor with their machines.

Adjoining bay No. 3, and in the center of this manufacturing building,

Buffalo Works, Buffalo, N. Y.

is the fireproof stockroom, carrying complete stock of smaller parts used in the product of this works. This stockroom practically divides the shop in two parts, as the remaining three bays are devoted entirely to tee rails, the assembling of car frames and hand power elevators, and to forge work. The end or transverse bays are devoted, respectively, to receiving and storing material and to shipping the finished product. Railroad track facilities permit of cars being placed in either of these bays, and the loading and unloading is economically handled by means of the electric cranes referred to above.

Since the above building was completed, an extension has been added to the north end, consisting of a warehouse 96 feet x 70 feet, and a wood shop 137 feet x 60 feet, which will enable the Buffalo Works to manufacture the hand power elevators required for the eastern territory, the Peru Works having been sold. The balance of the hand power apparatus required for western territory will be manufactured at the Quincy Works.

These Works are operated entirely by Niagara Falls power, which is supplied at a rate lower than it is possible to generate it in an isolated plant of small capacity. Electric motors, both direct current and alternating current, are used about the Works under conditions they are best suited for. The power circuit from Niagara is 3 phase, 25 cycles, 2,200 volts, and it is transformed by motor generator units into direct current at 220 volts, for use on the electric cranes and machine tools requiring variable speed control. For the alternating current motors, the voltage is reduced by static transformers from 2,200 to 440.

The plant is heated by direct radiation from coils located along the walls under the windows, and also around the steel columns, the medium being hot water under forced circulation from the boiler house adjoining the main building.

Inspection of the cuts will show that this shop is amply and uniformly lighted throughout. Artificial illumination is provided by means of Tungsten lamps of various sizes, used singly and in clusters to suit the requirements of the various locations. Other means of artificial illumination have been tried, but the Tungsten lamps have been found to give the most satisfactory results.

Buffalo Works, Plunger and Buffer Department.

One of the most interesting features of the Buffalo Works is the highly developed planing and milling machinery used in the finishing of tee rails. After being straightened, the rails are planed six at a time on high-speed planers, being finished in one cut, so that it is not necessary to take an additional finishing cut. This is accomplished by having roughing and finishing tools working at the same time. After being planed, they are passed to the combined milling and drilling machines, which mill the tongue and groove on the ends and drill four holes for the fish plate bolts in each end at one setting. After coming from these machines, they are "slushed" and passed to the "finished" rail pile, ready for shipment.

The yearly requirements for tee rails have grown from 19,000 in 1905 to over 70,000 in 1911, and the indications are that the output for the present year will exceed this latter amount. If these rails were laid end to end, they would extend about 215 miles, and would weigh 7,250 tons.

Buffalo Works, Electric and Belt Machines Department.

Hale Brothers' Dep't. Store,

San Francisco, Cal.

Hale Brothers, Incorporated, is one of the largest mercantile concerns on the Pacific Coast, operating stores in San Francisco, Stockton, San Jose, Sacramento and Los Angeles, Cal.

Shortly after the fire of 1906 in San Francisco, they erected a large store at the corner of Sixth and Market Streets. The company has now outgrown the comparatively new quarters, and has in course of erection at the southwest corner of Fifth and Market Streets, San Francisco, a new structure, which they will occupy before January 1, 1913.

The new building has a frontage of 175 feet on Market Street and 165 feet on Fifth Street. The main portion of the building is five stories in height, one section, 30x100 feet, being nine stories in height. The building

Buffalo Works, Rail Department.

is constructed entirely of reinforced concrete with cement facing. The roof is to be arranged for a roof garden and children's playground. All six of the passenger elevators will travel to the roof. The excavation for this building was started on April 5th, and 18,000 yards were excavated in twelve days. The building was roofed in in eighty-five days after work was started on the excavation. About five million board feet of lumber were used in making the forms for the concrete.

The elevator equipment consists of six Otis No. 4, single screw drum electric passenger elevators, traveling from the basement to the roof, one No. 3 single screw drum electric freight elevator, three full automatic electric dumbwaiters complete with telephone system, and one Reno type incline dock elevator, running from the basement to the sidewalk.

The architects are Messrs. Reid Brothers, of San Francisco, and the general contractors are Messrs. Macdonald & Kahn.

Woodmen of the World Building,

Omaha, Neb.

The Woodman of the World Building, recently completed at Omaha, Neb., combines many features of interest. It is located on the southwest corner of 14th and Farnum Streets, one of the busiest corners in the heart of the wholesale and retail districts. The building faces 110 feet on Farnum Street and extends south on 14th Street 132 feet to the alley, and, being L-shaped, this affords the maximum of light and ventilation, as all offices have outside exposures. The building contains eighteen floors, and is 242 feet in height, being the tallest building in the State.

The exterior architectural treatment is of the Italian Renaissance style; the

Woodmen of the World Building.

first three stories are of Platte Canon pink granite, surmounted with thirteen stories of brick and terra cotta in the pylon and panel effect, and the whole, capped with two stories of terra cotta heightens the pleasing effect of the lower stories. The entrance corridor is entirely faced in Colorado Yule marble, trimmed with Italian Skyros. Two large marble grand staircases, with marble balusters, lead to the second floor.

The third to eighth floors of the building have been especially arranged for and leased to the Woodmen Circle and Woodmen of the World, for general offices. On the seventeenth and eighteen floors are located the quarters of the Commercial Club of Omaha, with a magnificent banquet hall. On the roof is an observation gallery, permitting an excellent view of the surrounding country.

The building was built under the direction and supervision of the building committee, in colaboration with Mr. John W. Walshe, office building specialist and building manager, resulting in many novel and practical features, assuring maximum efficiency. Among these may be mentioned the use of prismatic glass in the upper sash of windows, to direct the light rays to the rear of the offices. Outlets for light, fans and telephones are so arranged that they may be brought into the rooms at any point desired, without exposed wiring. Also automatic heat regulation, scientific illumination, office ventilation, hot and cold water in every office, vacuum cleaning, etc., etc. The building has its own electric and refrigerating plant.

The elevator equipment consists of six Otis 2:1 Gearless Traction Passenger Elevators, with a capacity of 3,000 pounds at a speed of 450 feet per minute; also one Electric Dumbwaiter, with a speed of 150 feet per minute, and traveling to the seventh floor only. The elevator machine room is conveniently arranged and is fitted with Lardwood floor, mahogany and brass trimmings, and is one of the exhibition rooms of the building.

The general contractors for the building are the Selden-Breck Construction Company, of St. Louis, Mo. The architects are Messrs. Holabird & Roche, of Chicago, Ill., and associate architects, Messrs. Fisher & Lawrie, Omaha, Neb.

Foreign Notes.

The following is a list of contracts recently closed by the Berlin office:

Graff & Heyn, two Otis Electric Passenger Elevators, 1,980 lbs. at 200 feet a minute, three phase alternating current. These are to be installed for the above named in a department store, to be erected in the Charlottenburg district of Berlin.

De Wendel & Cie, one Otis Furnace Hoist, capacity, 14,100 lbs.; speed, 300 feet per minute; 240 volts, direct current.

Museum Alexander Koenig. The well-known Professor Alexander Koenig, of Bonn, is presenting his city with a museum, which will contain two Otis Passenger Elevators.

Regierungsbaumeister Crzellitzer, three Otis Electric Passenger Elevators.

Hotel Silesia, one Otis Electric Passenger Elevator.

Platinum Has Many Uses.

The mineral called platinum is really a natural alloy of platinum, iridium, rhodium, palladium, and often osmium, with varying amounts of iron, copper, and gold, according to the United States Geological Survey. It is usually found as small nuggets, scales, and rounded or irregular grains; its color is steel-gray. The specific gravity of the crude platinum varies from 14 to 19. The percentage of the metal varies also within wide limits, usually from 70 to 85 per cent. Platinum is almost wholly produced in California and Oregon, and the output for the United States is practically limited to these States.

Owing to its high melting point and great resistance to acids, platinum is extensively used for laboratory utensils. Platinum salts are employed in chemical analysis. In photography, dentistry, and electric installation much platinum is used. Of late the manufacture of jewelry has consumed large quantities of it. It is extensively used for chains and for the setting of diamonds, the claim being made not only that it is more resistant than silver and harder than gold, but that the stones are better offset by platinum and appear larger than in any other kind of setting.

What an Elevator Is.

An elevator is a sort of passenger skyrocket by which a person can be yanked off the earth and into a cooler climate forty-nine stories above in less time than it would take him to climb three flights of stairs and mop his forehead twice.

The elevator was invented in America, which also produced the quick-lunch counter, the revolver and other time-savers, and it has enabled man to colonize the air. Half a century ago nobody lived more than seventy feet above the ground. Nowadays men do business happily 100 feet aloft, and discharge their office boys for stealing eagles' eggs off the fire escapes instead of attending to business.

Some elevators travel 300 feet a minute, making stops at all way stations, while others run express to the three-dozenth floor at the rate of 600 feet a minute, the passenger's vital organs following slightly behind. By taking a local up four floors and catching an express down to the city proper, a hurried financier can leave his office in the sunshine, slide down through a thunderstorm and borrow an umbrella from a friend on the sidewalk in less than a minute's time.

Elevators are run by men and boys,

State & Quincy Building, Chicago Ill.

who are kept so busy that they do not have time to take tips. This accounts for the enormous popularity of this ingenious contrivance in this country.

What is an Invention?

The generally accepted opinion that a new and useful improvement is an invention is not far wrong. But not all inventions are patentable, as has been judicially determined.

We have a recorded instance of a boy who saw the walking beam of a steam engine moving up and down near a valve which he had to open and close by hand. He tied a string to the walking beam and the valve, and the automatic steam engine was invented.

The question was put tentatively to a high official in the Patent Office, who thought "so simple a thing would not amount to invention—anybody could do that!" Yet the Supreme Court has referred to Stephenson's invention as one of the greatest of all ages, simple as it was.

Improvement is invention, and improvement in the statutory classes of invention is patentable invention. The best inventions are generally such as anybody could make, after they know how!

The rule laid down by Chief Justice Carter, Supreme Court, District of Columbia, was, "if a man has made a change, give him a patent for the difference." More recent rulings have been less liberal, but it would seem to be a fair rule to give a man a small patent for a small invention, and let him demonstrate its usefulness.

State & Quincy Building,

Chicago, Ill.

The State and Quincy Building, now being erected at the northwest corner of State and Quincy streets, by Mr. J. L. Kesner, will be of the highest class of steel fireproof building, twenty-one stories in height, built on caisson foundation to rock bottom. The building has a frontage of sixty-two feet on State street, and one hundred and forty-four feet on Quincy street. Owing to adjacent property being under same ownership, natural light and air are assured on all four sides of the building above the sixth floor.

The exterior walls of the building will be of glazed white terra cotta of simple design. The interior finish will be mahogany trim throughout, with marble walls and floors in corridors. The entrance and corridor on State street will be finished in white Italian marble and Mosaic floor, with bronze fixtures for indirect lighting and solid bronze elevator enclosures.

The lower floors of the building will be devoted principally to shops, and the floors above the seventh for office purposes.

The elevator equipment will consist of six Otis Gearless Traction Passenger Elevators, with a carrying capacity of twenty-five hundred pounds, and a speed of 550 to 600 feet per minute; also one Otis Worm Gear Traction Freight Elevator, with a speed of 400 feet per minute to travel from the sub-basement to attic floor, a distance of 303 feet 6½ inches, and one Otis Drum Type Short-Rise Passenger Elevator, with a speed of 150 feet per minute to travel from basement to second floor.

The architects for the building are Messrs. Jenny, Murdie & Jensen, Chicago, Ill.

Chicago Telephone Building.

Chicago Telephone Building,

Chicago, Ill.

The new twenty-one-story office building of the Chicago Telephone Company, now nearing completion at 212-226 West Washington Street, is an indication of the rapid but substantial growth of that company. In this building will be housed the general offices of the Bell companies in the middle western states. This division includes the Chicago Telephone Company, the Wisconsin Telephone Company, the Central Union Telephone Company, the Cleveland Telephone Company and the Michigan State Telephone Company, taking in the unified telephone service of Ohio, Indiana, Michigan, Wisconsin and Illinois.

The new structure has a frontage on West Washington Street of approximately 140 feet, and is situated east of and adjoining the present main office building of the company at the northeast corner of Franklin and Washington Streets. Ultimately this building will be removed and the new structure extended to the Franklin Street line, giving it a total frontage of 220 feet on Washington Street.

The architectural style of the façade may be termed a French adaptation of the classic. The lower stories are of gray Bedford stone. The architectural features are simple and massive in proportion and detail. The entrance is marked by two great arched openings, fitted with doors and screens of solid bronze. Both of the entrance arches have lunette panels in terra cotta, the backgrounds of which show the Eastern and Western Hemisphere of the earth, and upon these, finely modeled figures of Mercury encircling the globe with his cables, a symbol of the function of the telephone.

The shaft of the façade is of dark red brick, with balconies at alternate stories to add interest to the design and to form a connecting feature between the upper and lower stories, uniting the design into a harmonious whole, both in architectural features and in color scheme. The upper stories are of terra cotta of the same color as the stone below. A continuous balcony course supported by large ornamental consols projects at the eighteenth floor. Upon this stands a colonnade of Ionic pilasters, the whole being surmounted by a richly ornamental entablature.

The entrance lobby is 35 feet square and two stories in height. The walls are treated with Corinthian pilasters and paneling of white statuary marble, relieved with panels of richly colored Brescia marble. The ceiling design is a series of deep coffers profusely ornamented and having a harmonious color scheme.

Opening out from the lobby are the main staircases and elevator corridor, designed in the same style as the lobby and in the same materials.

The structure is of the most modern steel skeleton fire-proof construction. It is carried on sixty-four caissons, varying in diameter from 4 feet to 9 feet 8 inches, extending to bedrock. Structurally, the building has no unusual features, although the method of supporting the columns above the center of the vestibule is worthy of note. The location of the vestibule is such that a column would normally be placed at its center. In order to keep this area free from columns, and to provide at the same time the necessary columnar support for the floors above, the vestibule is spanned by a steel truss, one story in height, and having its lower cord at third-floor level. On this truss the column for supporting the upper stories is carried.

The elevator equipment of the building is to consist of eight Otis Gearless Traction Passenger Elevators having a speed of 500 feet per minute, and one Otis Worm Gear Traction Freight Elevator having a speed of 350 feet per minute.

The general contractors of the building are the James Black Masonry and Contracting Company, of St. Louis, and the architects are Messrs. Holabird & Roche, of Chicago.

Electric Control of Hydraulic Elevators.

Probably ninety-nine per cent., if not more, of the hydraulic elevators in use are controlled by strictly mechanical means, such as hand cable for slow speed freight elevators and

lever devices for high speed passenger elevators in office buildings. The hand cable is the simplest device used, and the standing rope lever device as used by the Otis Company is as simple as possible.

That these devices are universally employed proves their safety and reliability; but, of course, both must be kept in good condition and adjusted from time to time in order to obtain the best operation. While these are satisfactory for elevators in factory and office buildings, where there are operators with plenty of muscle to handle them, they are not altogether suited to private house installations, where any member of the household may have to use them.

There were many hydraulic elevators in private houses prior to the advent of the electric elevator, and some have been installed since, owing to the fact that electric current was not available.

The need for some easy and reliable method of control for such private house machines was early apparent, and it was desirable that it occupy small space, as such elevator cars are necessarily small and lever devices occupy considerable room. It was also essential that, whatever device was provided, it be so arranged that the hatchway door could not be opened unless the car was at that particular door; nor could the car be moved until the door was closed, as

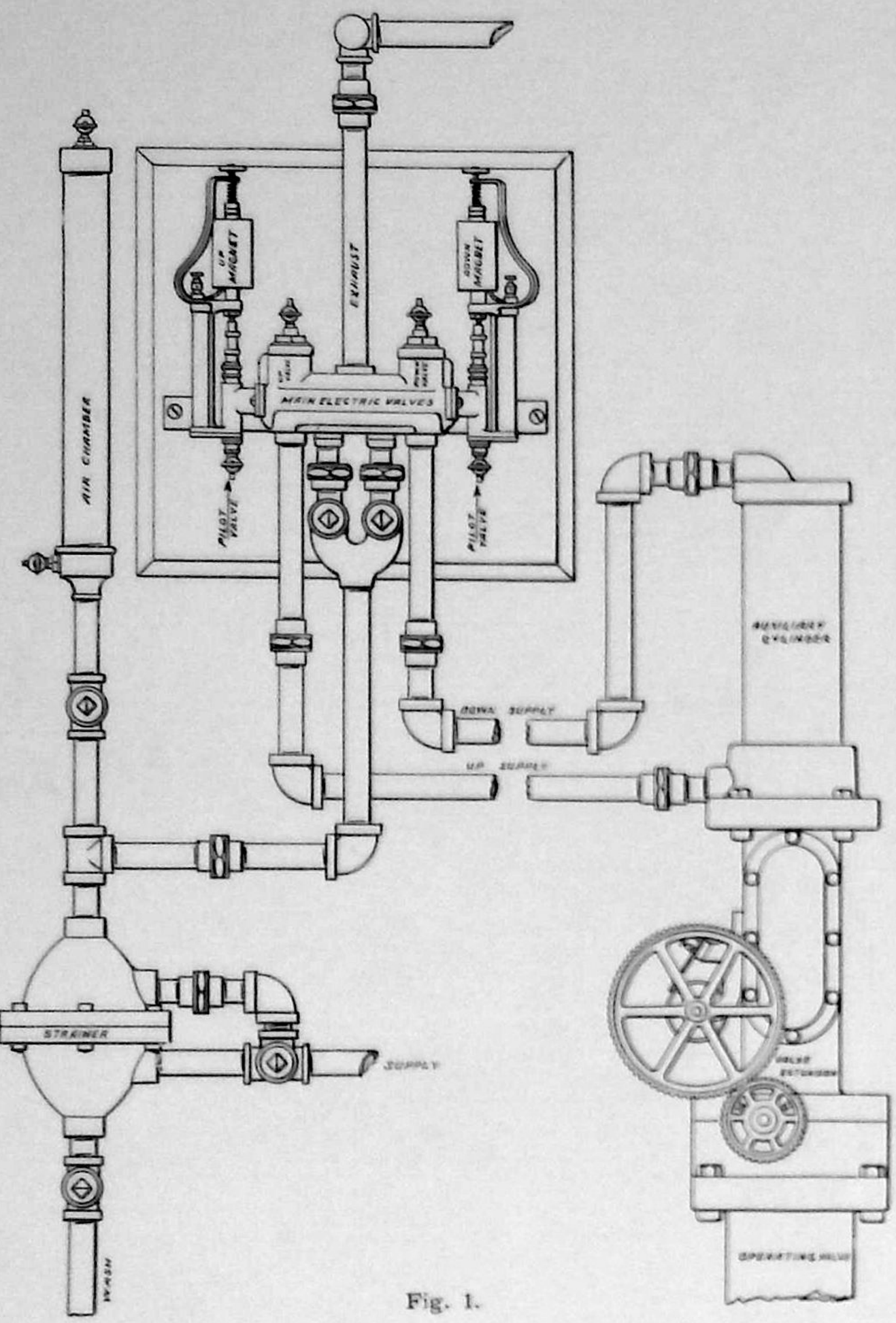
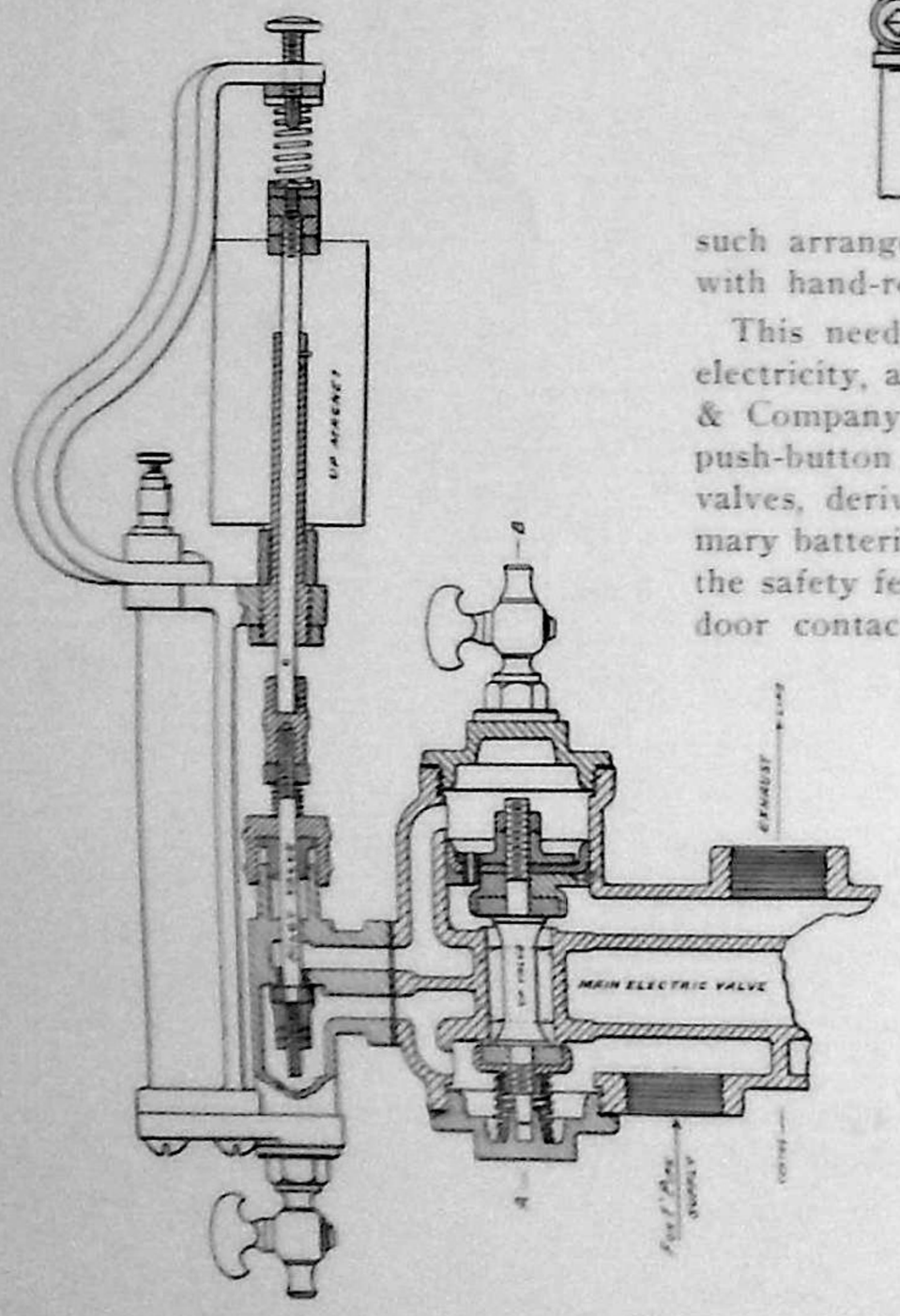


Fig. 1.



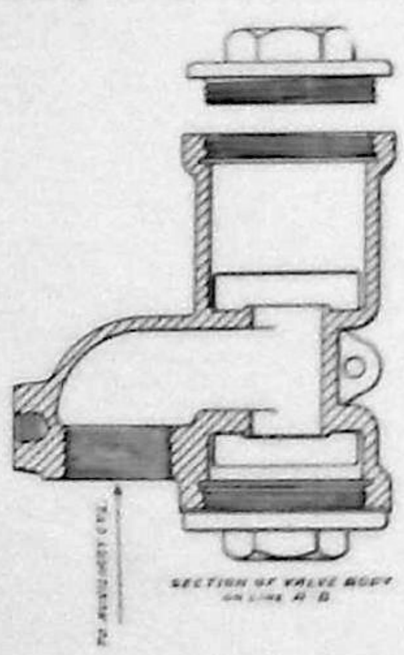


Fig. 2.

such arrangements were then in use with hand-rope control.

This need was met by the use of electricity, and in 1888 Otis Brothers & Company brought out an electric push-button control for hydraulic valves, deriving the power from primary batteries. This system included the safety feature of the now familiar door contact, which, if a door was left open, rendered the system inoperative. The records show that a number of these systems were installed, and it is believed that some are still in satisfactory operation.

Figure 1 shows a general arrangement of the electric and hydraulic mechanism comprising this system, which consists of the familiar rack and pinion valve, modified as follows.

In place of the usual conical cap a "Valve Extension" is used; on the upper flange of which is bolted an auxiliary cylinder of the same diameter as the valve, containing a piston packed with two cup leathers looking away from each other. A pipe connection is provided at each end of this cylinder. The piston is connected to the valve rack by a rod passing through a stuffing box on the lower head of the auxiliary cylinder and wholly inside the extension. Access to this stuffing box is had through a large hand hole plate in the extension. The operating valve is controlled by this auxiliary piston

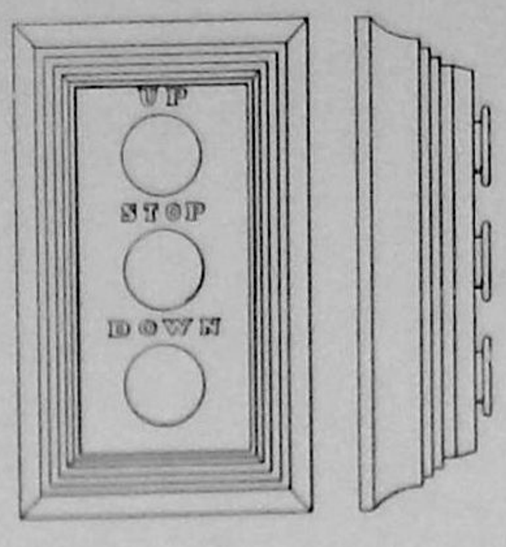


Fig. 3.

either up or down, as water is admitted below or above it.

The direction of flow of water is controlled by means of the "up" and "down" magnets, pilots and main electric valves, which are shown in the line engravings. In order that the system may not be clogged by dirt, etc., in the water a strainer is provided, as shown, with means for washing out the same without the necessity of taking any of it apart. An air chamber is also provided to prevent shocks due to the possible sudden closing of the electric valves.

As will be seen in Fig. 2, which shows a section through the "up" valve, the pilot is held normally closed by the spring on the pilot valve stem below the magnet. The main "up" valve is also held closed by a spring beneath it. When the magnet is energized the armature, located above it, is drawn down and the pilot valve is opened. This allows water to flow through the pilot and to the top of the main valve. The area of the top being greater than the lower part and packed with a leather cup, the main valve is opened downward and in turn admits water through the rear port to the auxiliary cylinder under the piston; it forces the water above the piston through the "down" valve to the exhaust. This exhaust may be connected to the discharge from the operating valve, in which case a check valve is used to prevent back pressure. The "down" valve, pilot and magnet are duplicates of the "up" valve. The energizing of the "up" magnet is accomplished by the pressing of the "up" button on the switchboard or button plate shown in Fig. 3. The button must remain pressed until the auxiliary piston reaches its limit of travel, else the operating valve will not be fully opened, and slow speed of car will result.

By referring to Fig. 4 it will be noted that there is a series of slip rings or commutators mounted on a shaft and rotated through gears by the operating valve pinion shaft. These slip rings and brushes are so arranged that when the auxiliary piston reaches either end of its travel the current is cut off the "up" or "down" button, as the case may be. The stroke of the valve may be adjusted by varying the position of the "dead" spot on the rings, for, as the current is cut off, the pilot and main electric valves close, shutting off the flow of water from the auxiliary cylinder and stopping the piston and operating valve.

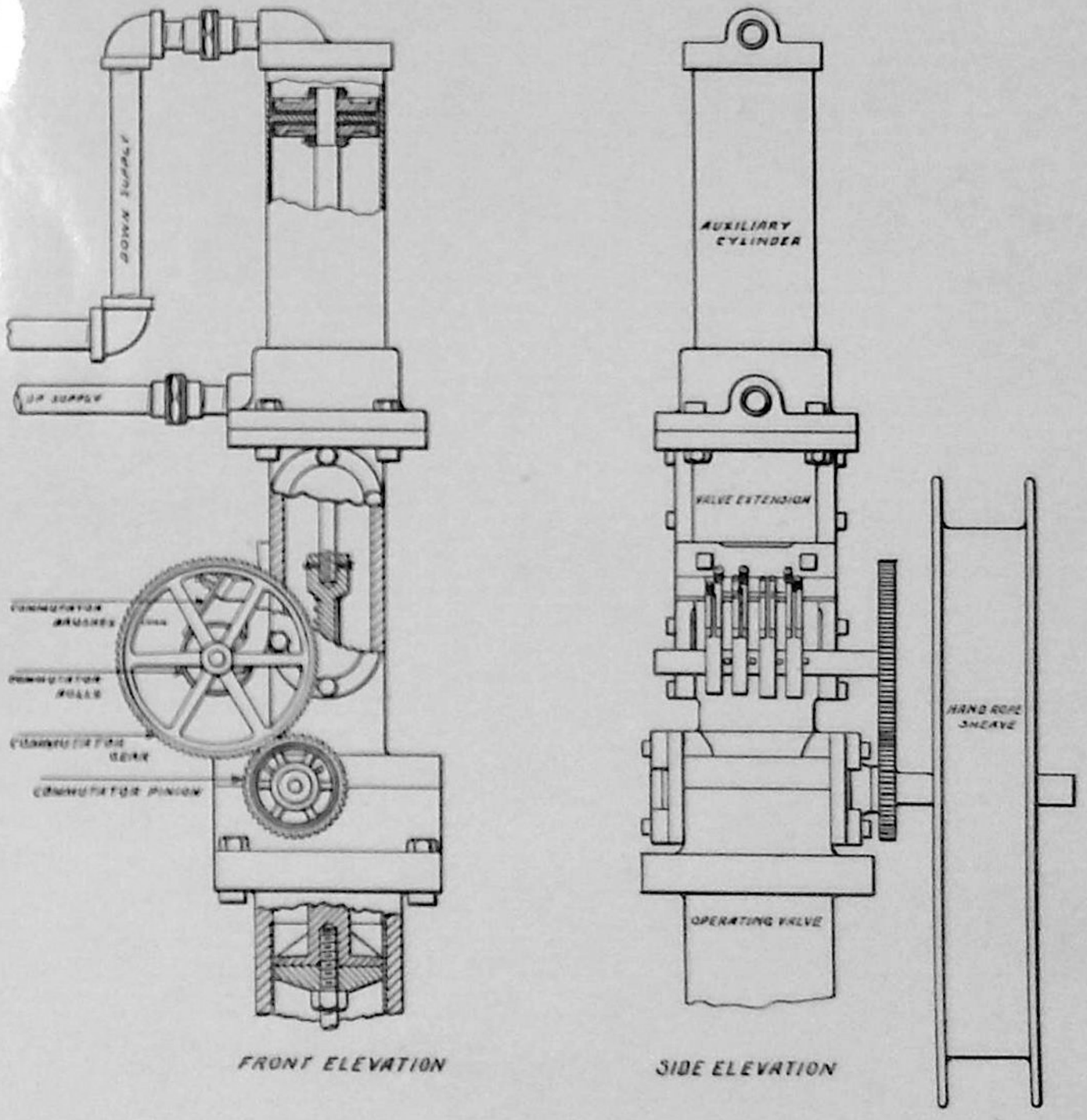


Fig. 4.

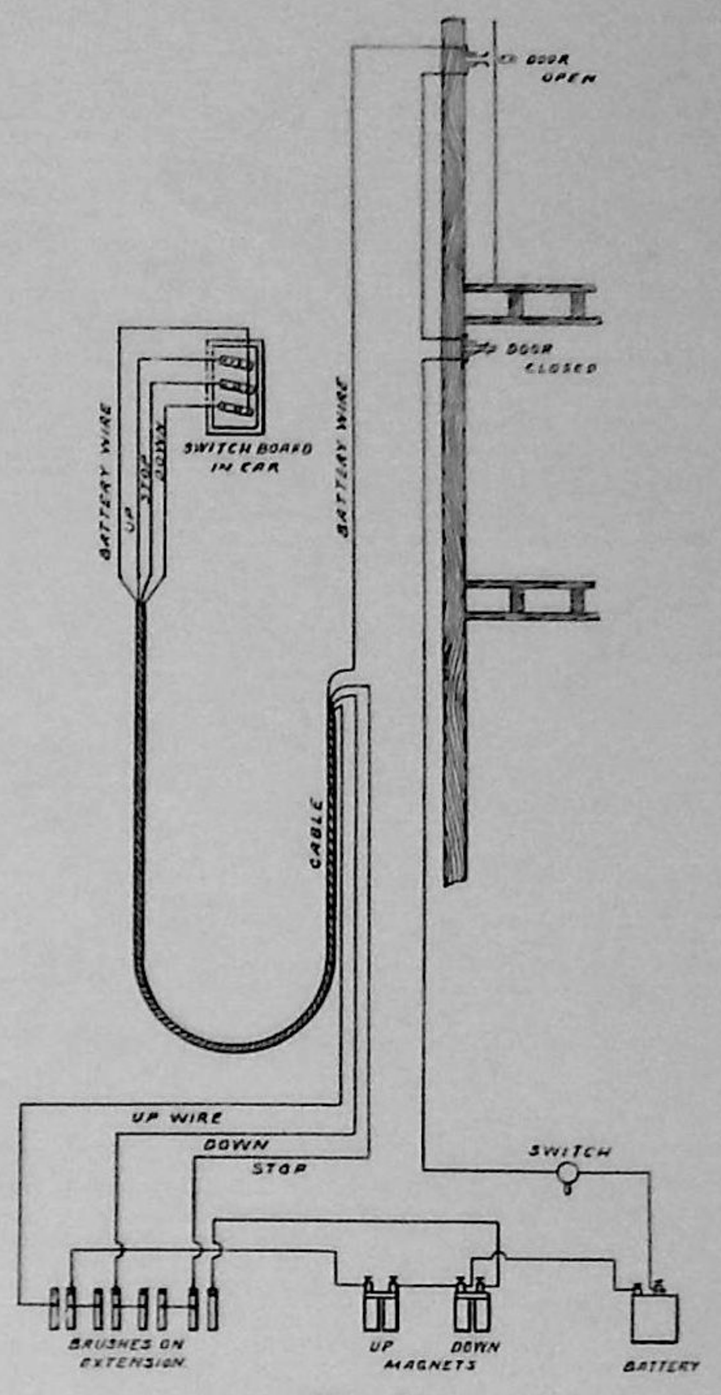


Fig. 5.

To stop the elevator the "stop" button is pressed, which, if the car has been going up, operates the "down" magnet and valves and admits water above the auxiliary piston. When this piston reaches the center of its travel and the operating valve is closed, the "dead" spot in the slip ring, corresponding to stop button, cuts off the current and lets the pilot and main valves close. A wiring diagram is shown in Fig. 5. It requires only six cells of Leclanche battery to operate this system. If lighting current is available it can be used instead of the batteries.

The usual hand rope is installed and attached to the valve sheave shown, to serve as an automatic stop at the top and bottom landing.

The device was well designed and operated very satisfactorily.

Although only one switchboard or push button plate is shown for the car, one can be placed at each landing, so that the car can be called from any position to each landing.

While not an automatic control, this was a great improvement over the hand rope for private house installations.

DIRECTORY OF OFFICES

United States

New York—Main Office: Eleventh Avenue and Twenty-sixth Street.

Works: Yonkers, N. Y.
Works: Harrison, N. J.
Works: Buffalo, N. Y.

Chicago—Main Office: 600 West Jackson Boulevard.

Works: Chicago, Ill.
Works: Quincy, Ill.

St. Louis—Office: Security Building.
Works: 8th and Mullanphy Streets.

Houston—Office and Works: German Street.

San Francisco—Office and Works: Stockton, North Point and Beach Streets.

Branches—Domestic

Albany, N. Y.—40 Beaver Street.
Altoona, Pa.—1125½ Twelfth Avenue.
Atlanta, Ga.—Kontz Building.
Atlantic City, N. J.—14 North Presbyterian Avenue.
Augusta, Ga.—117 Montgomery Building.
Baltimore, Md.—Equitable Building.
Birmingham, Ala.
Boston, Mass.—34-35 India Street.
Buffalo, N. Y.—Franklin and Huron Streets.
Charleston, S. C.
Charleston, W. Va.—19 Hale Street.
Charlotte, N. C.—209 N. College Street.
Chattanooga, Tenn.—819 Cherry Street.
Cincinnati, Ohio—1014 Mercantile Library Building.
Cleveland, Ohio—701-707 St. Clair Avenue, N. E.
Columbus, Ohio—230 N. Third Street.
Dallas, Texas—Young and Akard Streets.
Denver, Col.—1626-1628 Glenarm Street.
Des Moines, Iowa—209 Crocker Building.
Detroit, Mich.—Fifth and Fort Streets.
Duluth, Minn.—109 Second Ave. W.
Erie, Pa.—1509 Sassafras Street.
Fort Worth, Texas—Cotton Exchange Building.
Grand Rapids, Mich.—40 South Ionia Street.
Harrisburg, Pa.—4 North Fifth Street.
Hartford, Conn.—Courant Building.
Honolulu, Hawaii—Von Hamm, Young & Co., Ltd., Alexander Young Bldg.
Indianapolis, Ind.—101-107 Kentucky Avenue.
Jacksonville, Fla.—Buckman Building.
Kansas City, Mo.—1918 Wyandotte St
Knoxville, Tenn.—424 Wall Street
Little Rock, Ark.—219 West 3rd Street.
Los Angeles, Cal.—218-220 East Fourth Street.
Louisville, Ky.—206 West Main Street.
Lynchburg, Va—109 Eighth Street.
Macon, Ga.—Commercial National Bank Building.
Memphis, Tenn.—Third Street and Madison Avenue.
Milwaukee, Wis.—115-117 Huron St.
Minneapolis, Minn.—415 South 4th St.
Mobile, Ala.—270 N. Royal Street.
Moline, Ill.—120 17th Street.
Montgomery, Ala.—First National Bank Building.
Nashville, Tenn.—148 6th Ave., North.
New Haven, Conn.—82 Church St.
New Orleans, La.—852 Carondelet Street.
Norfolk, Va.—65 Fayette Street.
Oklahoma City, Okla.—213 W. First Street.
Omaha, Neb.—1214 Howard Street.
Philadelphia, Pa.—12th and Sansom Streets.
Pittsburgh, Pa.—Keenan Building.
Portland, Me.—495 Fore Street.
Portland, Ore.—88 First Street.
Providence, R. I.—218-222 South Main Street.
Reading, Pa.—420 Chestnut Street.
Richmond, Va.—12 South Tenth Street.
Rochester, N. Y.—Frank and Commercial Streets.
Saint Paul, Minn.—10 Endicott Bldg.
Salt Lake City, Utah—Judge Building.
San Antonio, Texas—104 Yturri Street.
San Diego, Cal.—1103 G Street.
Savannah, Ga.—Germania National Bank Building.
Scranton, Pa.—217 Spruce Street.
Seattle, Wash.—26 West Connecticut Street.
Spokane, Wash.—821 Paulsen Building.
Springfield, Mass.—356 Main Street.
Syracuse, N. Y.—374 West Fayette St.
Tampa, Florida., 209 Krouse Street.
Toledo, Ohio—522 Jackson Avenue.
Trenton, N. J.—821 Carteret Avenue.
Utica, N. Y.—114 Arcade Building
Waco, Texas—Times Herald Building.
Washington, D. C.—Metropolitan Bank Building.
Wheeling, W. Va.—1311 Jacob Street.
Wilmington, Del.—215 Ford Building.
Worcester, Mass.—Central Exchange Building.
Youngstown, Ohio—Federal Building.

Canada

Otis-Fensom Elevator Co., Ltd.:
Main Office: Traders Bank Building, Toronto, Ont.
Works: Victoria Avenue, Hamilton, Ont.

Branches

Montreal, P. Q.—368 St. James Street.
Calgary Alta—322 Ninth Ave., W.
Ottawa, Ontario—9 O'Connor Street.
Vancouver, B. C.—157 Water Street.
Winnipeg, Manitoba—316 Cumberland Avenue.
Victoria, B. C.—526 Chancery Lane. Ave.
Edmonton—562 Second Street.

Foreign

Otis Elevator Company, Ltd.—Main Office 4 Queen Victoria Street., London, Eng.

Birmingham, England	(Branch Office).	
Bradford, England	"	"
Brighton, England	"	"
Glasgow, Scotland	"	"
Liverpool, England	"	"
Manchester, England	"	"
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Otis Elevator Gesellschaft, M. B. H.—Koniggratzerstrasse 97, Berlin, Germany.
Factory: Berlin-Wittenau.
Budapest, Austria-Hungary—V, Vecsey-utca 3.
Amsterdam, Holland—Fred. Stieltjes & Co., Keizirsgracht, No. 745.
Brussels, Belgium—Compagnie Belge des Ascenseurs Otis, Chaussee d' Anvers.
Antwerp, Belgium—Compagnie Belge. des Ascenseurs Otis.
Ostend, Belgium—Compagnie Belge des Ascenseurs Otis.
Moscow, Russia—John Block Company
Rustof D, Russia—John Block Company
St. Petersburg, Russia—John Block Company.
Warsaw, Russia—Messrs. Chr. Brun & Son, Agents.
Barcelona, Spain—Peninsular Engineering Co., Poate del Angelio.
Madrid, Spain—S. Morris, Calle del Prado 10 Principal, Madrid.
Alexandria, Egypt—Egyptian Investment & Agency Co.
Cape Town, So. Africa—R. M. Ross & Co., Strand Street.
Durban, So. Africa—A. H. Johnson & Co., Ltd.
East London, So. Africa—A. C. Maytham & Co., Hanover Street.
Johannesburg, So. Africa—A. H. Johnson & Co., Ltd., Adelaide Building.
Pt. Elizabeth, So. Africa—A. H. Johnson & Co., Ltd.
Havana, Cuba—Sussdorff, Zaldo & Co., 36-38 O'Reilly Street.
Mexico City, Mex.—Enrique Schoendube, Apartado 756.
Newchwang, China—E. A. Sargent.
Shanghai, China—American Trading Company, 2 and 4 Hankow Road.
Tientsin, China—American Trading Co
Calcutta, India—Martin & Co., 6 and 7 Clive Street.
Kobe, Japan—American Trading Company, No. 99.
Yokohama, Japan—American Trading Company, 28 Main Street.
Bahia, Brazil—Guinle & Co., Rua Conselheiro Saraiva, 34.
Porto Alegre, Brazil—Lima & Martins Caixa do Correio, No. 64, Estado do Rio Grande do Sul.
Rio de Janeiro, Brazil—Guinle & Co. Avenida Central, 107.
San Paulo, Brazil—Guinle & Co., Rua Deirerta, No. 7, P. O. Box Q.
Buenos Aires, Argentine—Buxton Cassini & Co., Calle Suipacha Esq. Tucuman.
Rosario de Santa Fe, Argentine—Buxton, Cassini & Co., San Lorenzo 1201 Esq Mitre.
Santiago, Chile—Spencer & Waters, Casilla 627, or Pasaje Balmaceda No. 11.
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